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Essay
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Selves, Walter E. (pseud. "Coal Dust")
Development of the coal industry in Alberta.
50p. graphs, maps, tables.

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University of Alberta,
Edmonton, Alberta,
Mar. 14, 1927

Dr. MacGibbon,
University.

Dear Sir:

I am submitting for the "Gateway Coal Research Competition", an essay entitled "Development of the Coal Industry in Alberta", by "Coal Dust".

Yours truly,
Walter E. Selnes

[illegible] first

1927
#4

DEVELOPMENT OF THE COAL INDUSTRY IN ALBERTA.

By "COAL DUST".

[illegible]

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DEVELOPMENT OF THE COAL INDUSTRY IN ALBERTA.

That the coal situation of Alberta should receive the great amount of attention that it has of late is due not only to local conditions but to the strikes in the Pennsylvania anthracite fields in 1922 and 1925. These strikes brought forcibly to Canadians the fact that we are so dependent upon the Americans for a very large part of our fuel supply. The shortage of coal for industrial and domestic purposes caused Canada to seek a solution which would make us independent, and Alberta was looked to hopefully, and deservedly, for within our boundaries we have coals ranging from anthracite to lignite which are satisfactory for every commercial and domestic purpose.

Before proceeding to discuss the Alberta situation it might be well to consider briefly the coal fields of Canada as a whole to obtain a better understanding of the problem that faces us.

Commencing at the west, British Columbia has both bituminous and lignite fields, producing nearly three million tons annually.

Alberta, with coal of every kind from lignite to anthracite, is estimated to have 85% of Canada's available supply and produces between five and six million tons per year.

Saskatchewan has large deposits of lignite near the southern border, but of such high moisture content that they do not store well and have a very small economic shipping radius.

Manitoba has poor grade lignite along the west, but imports the majority of her coal.

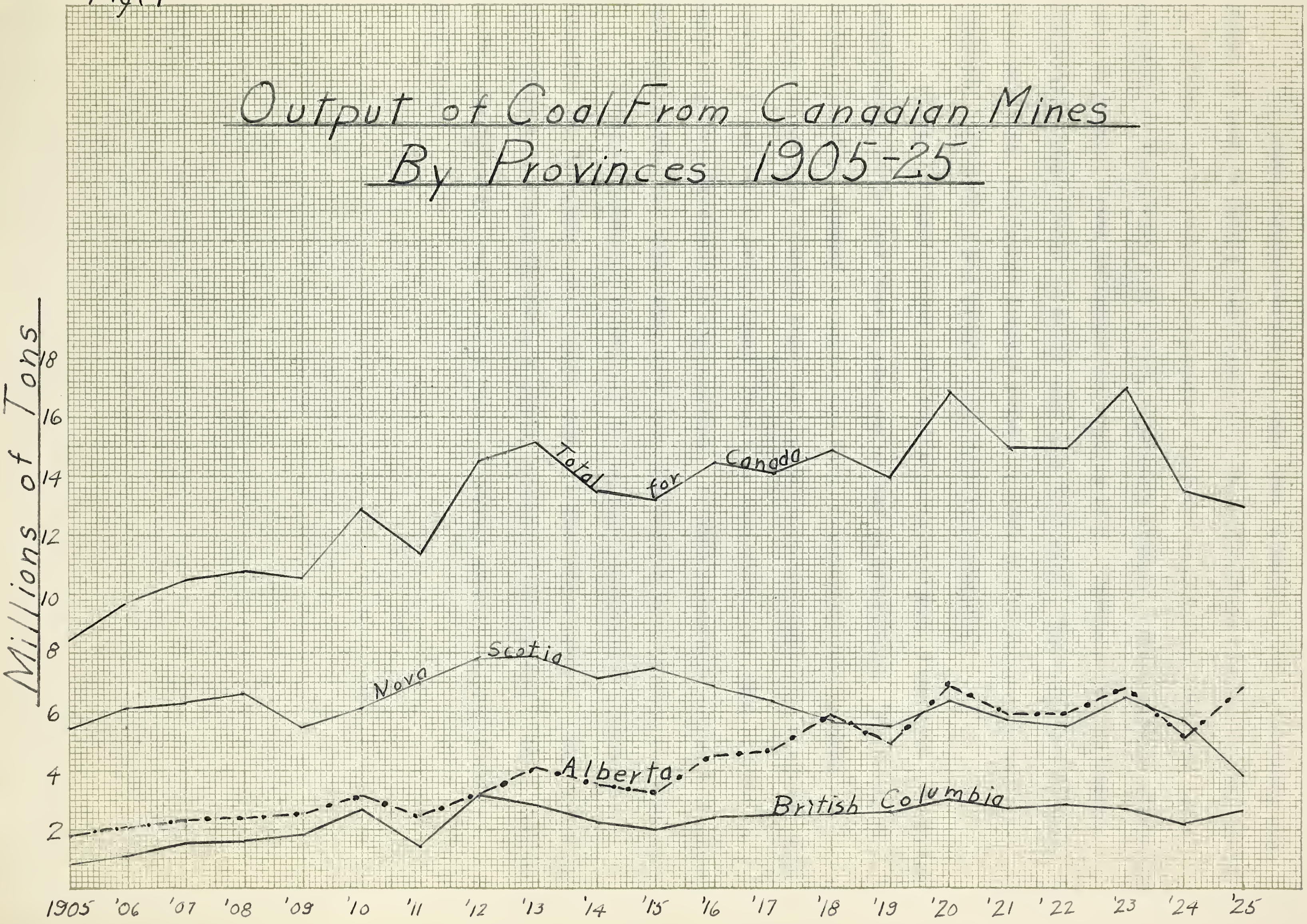
Ontario has no coal except a deposit of lignite along James Bay which is now being prospected.

Quebec has no coal, nor has Prince Edward Island.

New Brunswick has deposits of bituminous coal, but in such thin seams that it cannot be extracted profitably and very few mines are operating.

Nova Scotia has bituminous coal with excellent coking properties and

Fig. 1



Output of Coal From Canadian Mines
By Provinces 1905-25

has an annual production almost equal to that of Alberta.

The above survey reveals the fact that Alberta is the outstanding producer of coal in Canada (See Figure 1). As an industry, the age of coal mining in Alberta can be recorded in decades, although coal indications were found as early as the latter part of the eighteenth century. Peter Fiddler discovered coal on Rosebud Creek in the Drumheller area in 1792. Previous to this, Edward Unfreville found pieces of drift coal near Fort Pitt. The next time we hear coal mentioned Sir George Simpson refers in 1841 to its occurrence at Fort Edmonton. In 1845 it was found in the foothills district.

It was not until about 1881 that Alberta coal was of any real commercial importance, but in that year a seam was opened at Lethbridge. The Canadian Pacific Railway, engaged in laying the first trans-continental railway in Canada, found that it would burn satisfactorily in locomotives so a narrow gauge railway was built to Lethbridge. from where? From this date mining has been carried on more or less extensively in the province. In 1882 mines were opened at Canmore and Anthracite, the coal being used for construction work through the mountains.

Since the coal was first used for railway construction purposes the industry has developed until today there are over three hundred mines producing coal varying from anthracite to lignite, capable of supplying all local demand as well as an export market which could be vastly greater if orders were available.

The following table will give an indication of the growth of the industry during the period 1886 - 1925.

Production of Coal in Alberta 1886 - 1925

Table I[2]

Year	Production in Tons	Value in Dollars
1886	43,220	81,112
1890	128,753	198,298
1895	169,885	382,526
1900	311,450	778,625
1905	931,917	1,993,915
1910	2,894,469	7,065,736
1915	3,360,818	8,283,079
1920	6,907,765	30,186,933
1921	5,909,217	27,246,514
1922	5,990,911	24,351,913
1923	6,854,397	28,018,303
1924	5,189,729	18,884,318
1925	5,869,031	20,021,484
1926	6,114,000	

Source?
Table?

The majority of mines are in the lignite area and naturally lignite is produced to a greater extent than any other quality. A reference to Table II will give the situation at a glance. It will be noted that in 1923 the production of bituminous exceeded that of lignite but this was due to the railways creating a reserve in anticipation of a strike in 1924.

Source of data?

Table II[3]

Quantity	1922	1923	1924	1925	1926
Anthracite	40,417	107	---	---	---
Bituminous	2,846,405	3,243,803	1,514,382	2,145,635	2,750,000
Sub-bituminous	- - -	466,492	590,168	570,654	400,000
Lignite	3,104,089	3,143,995	3,085,179	3,152,742	2,960,000
Total in Tons	5,990,911	6,859,397	5,189,729	5,869,031	6,114,000

The coals of Alberta are found in the Cretaceous formation and in three horizons separated by marine shales. The lowest, the Kootenay, is coal-bearing and is separated from the Belly River formation by a strata of sandstone. This intermediate formation contains only a few coal seams but it covers such a large area that it is economically important. Has omitted Edmonton formation Figure II shows the coal areas of Alberta based on these geological formations.

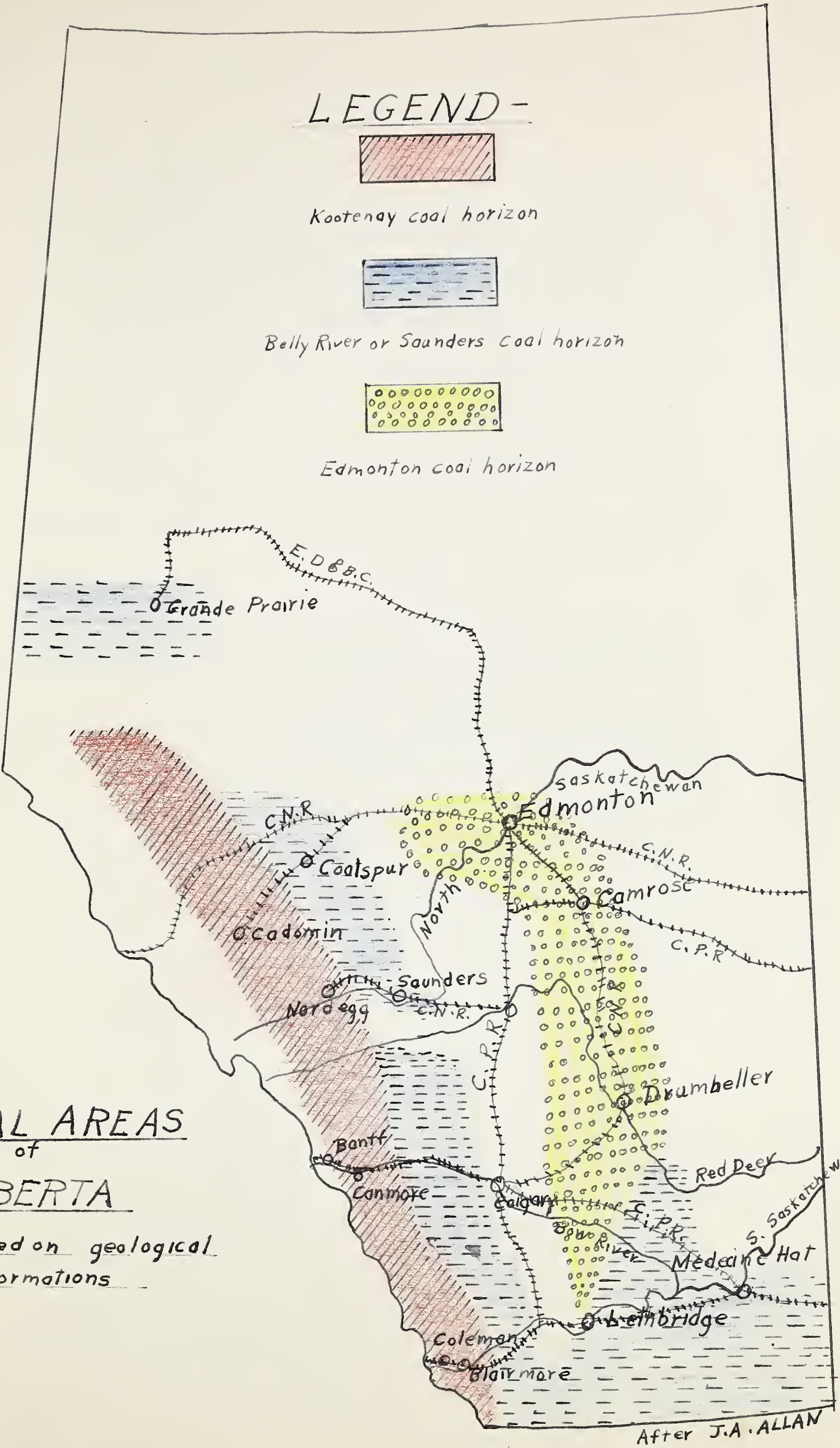
Edmonton Formation.- The third coal bearing strata, at the top of the Cretaceous, is a fresh water deposit known as the Edmonton formation. It consists of a series of beds formed at sea level or a little above it, when the central portion of the continent was emerging from the sea, but previous to the time of the Rocky Mountain uplift. The beds of the Edmonton formation cover a large portion of the province, extending from the International boundary to about latitude 55. The Edmonton has a group of thin seams aggregating about 5 ft. in thickness in the south, but becoming thicker to the north, reaching a maximum of 25 feet in an outcrop on the North Saskatchewan River, west of Edmonton. About 500-600 feet below this thick seam are a series of small seams which are mined at Edmonton, Tofield, Drumheller, and other points.

The character of the coal found at this horizon varies from lignite in the east to a coking coal in the foothills. (Evidently quoted from Dowling but not sourced)

Belly River Formation Coals.-

The beds which underlie the Edmonton were estimated by D. B. Dowling to cover an area of about 16,000 square miles in the eastern portion of the province. The quality of the coal increases on approach to the mountains, a

Fig. 2



COAL AREAS
of
ALBERTA

Based on geological formations

After J.A. ALLAN

much better coal being obtained at Lethbridge than at Medicine Hat; where this coal is exposed in the foothills it is harder than on the prairies and has coking properties.

Kootenay Formation.

The third important coal bearing strata, the Kootenay, is so deeply covered that it is exposed only in uplifted faults in the mountains. The coal is generally bituminous, although some semi-anthracite and possibly a little anthracite are found in it. In Alberta, coal is found in this formation from the United States boundary to beyond the Smoky river. In the Crowsnest Pass three valuable seams of Kootenay coal, ranging from 6 feet to 16 feet in thickness are worked.

Types of Coal

The coals of the province can be divided roughly into four classes, anthracite, bituminous, sub-bituminous, and lignite. We need consider only three of these classes for anthracite is not now being produced in the province. An anthracite mine was being operated near Banff by the Canadian Pacific Railway Company, but they found it advisable to close the mine in 1923 as it was not yielding profitable returns.

Bituminous coal is soft and friable, with a small moisture content (2% - 5%), but high in volatile matter and often has coking properties. It ignites readily but burns with a very black smoke, and this combined with its coking tendency makes it undesirable as a domestic fuel. Bituminous coal is found in several areas, the Crowsnest area with mines at Coleman, Blairmore, Hillcrest and Bellevue; the Cascade area with mines at Canmore; the Nordegg area with mines at Nordegg, and the Mountain Park Area with mines at Cadomin, Mountain Park, Luscar etc.

The Hoppe leases on the Sheep river, which were the cause of so much controversy a few years ago, do not, as is so popularly believed, contain anthracite. "There is no anthracite in the Sheep River or Smoky River areas; a large area on these rivers contains semi-bituminous coal".[4]

Sub-bituminous coal is of poorer quality than bituminous and has a greater percentage of moisture. It is produced in the Coalspur, Saunders and Lethbridge areas.

Lignite is a coal ranging in color from brown to black. Most of the Alberta coals used for domestic purposes are of higher quality than true lignite and the term "domestic" coal is applied to them. The moisture content is high, 10% - 30%, but it has a lower ash content than bituminous coal, the ash ranging from 5% - 10%, depending on the locality. "Domestic" coal has a calorific value of only 8000 - 10000 B. T. U. as compared with 13,000 - 14,000 B. T. U. of the bituminous coal. Despite its lower calorific value "domestic" coal is popular with the householder because it produces less ash and burns without smoke. The greater number of mines in the province produce lignite and are located in the Edmonton, Tofield, Camrose, Drumheller, Taber, and numerous other districts.

Seasonal Demand

There are over three hundred mines in the province; statistics for 1924 show that 351 wererecorded and this was a five per cent decrease from those reported in 1923. It must be remembered that these figures include all mines, from those producing a few tons to the very largest. The largest mines are found in the bituminous fields and depend largely upon the railways as consumers, although small quantities are disposed of as for coke, and some to industrial plants. This dependence on the railways causes a hardship both to the miner and the operator, for when the railways are busily engaged in hauling other commodities, such as grain, few cars are available for the mines, with resulting periods of slack times. During the summer the railways take all the coal the mines can produce and a period of steady work and prosperity reigns for a few months, but winter soon brings idle days and hardship to the miner.

The conditions in the lignite and sub-bituminous fields are much the same as they too depend on seasonal demand. The coal is disposed of to the householder and necessarily the greatest sale comes in winter, with little or no demand in the summer. During the winter months the work must be rushed and

the mines must be capable of producing a much larger tonnage than if there were a constant market.

It is thus only too evident that in both the bituminous and lignite fields the seasonal demand has led to overdevelopment, with its consequent unsteady work for the miner. Not only the operators but the miners are paying the penalty for this, and Albertans are very much interested in finding a solution of this problem where ~~as~~ will lead to much greater prosperity and to contentment, especially in the mining communities. An increased market would be an ideal solution, and with this in view, Alberta has for the past four or five years cast covetous glances towards Ontario whose market is supplied almost entirely by the coal fields of the Eastern United States.

Before discussing the possibilities of the Ontario market let us make a survey of the coal fields of the United States (See Figure 3) and thus clearly understand their relation to Canadian markets. In the United States 29 states produce coal in commercial quantities, there being nearly 200 anthracite and over 6,000 bituminous (soft coal mines. All of the American anthracite comes from a small area of about 480 square miles in eastern Pennsylvania. Approximately 93% of the bituminous coal comes from three major areas:

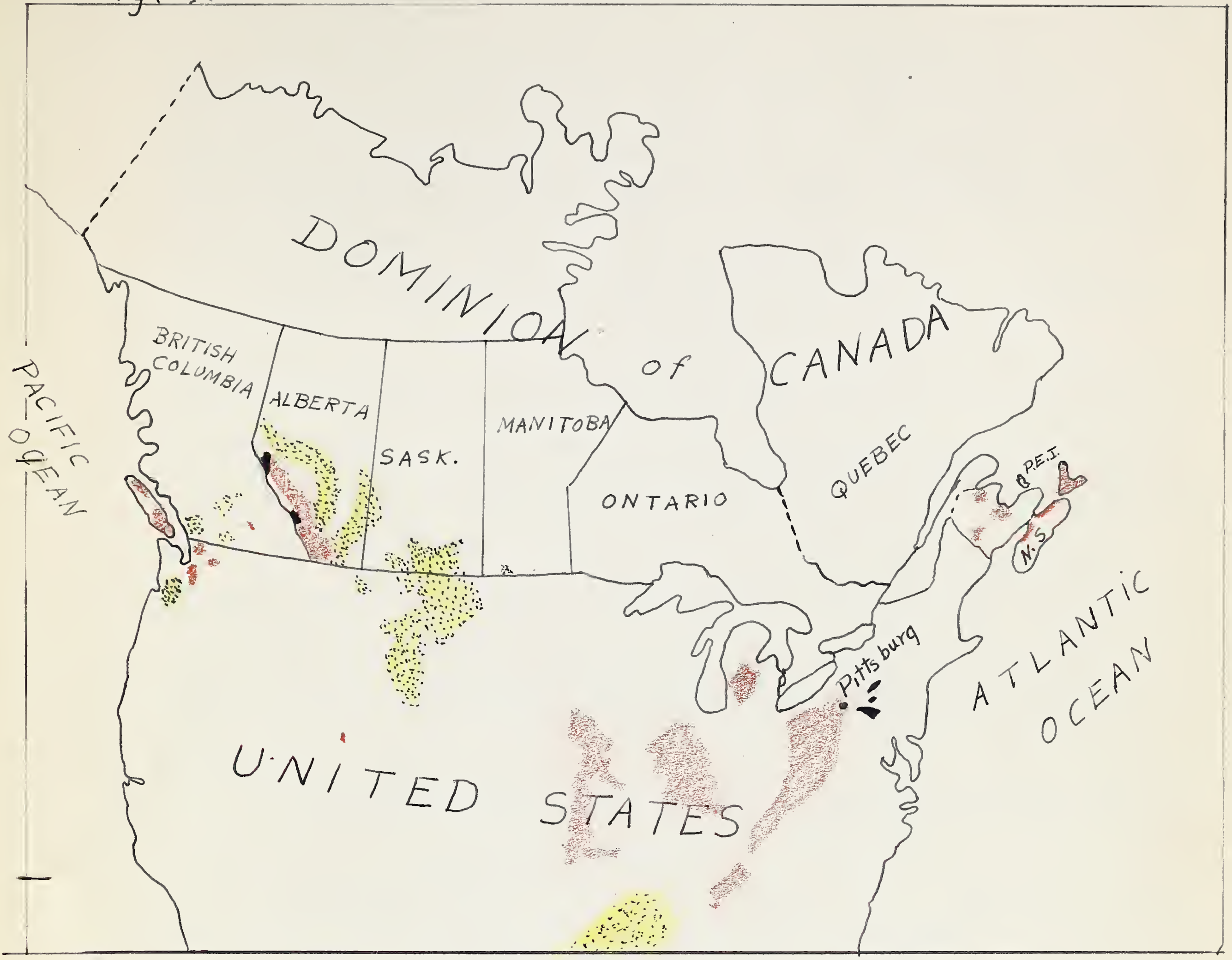
(1) The Appalachian Region - extending from Pennsylvania to Alabama.

(2) The Eastern Interior Region - including Illinois, Indiana and Western Kentucky.

(3) The Western Interior Region - extending from Iowa to Arkansas and Oklahoma.

About two thirds of the entire coal production of the United States comes from the above mentioned areas. The other American coal areas which have a direct influence on potential Alberta markets are the vast lignite fields of Montana and the bituminous fields of Washington.

Fig. 3



COAL FIELDS
in
CANADA and UNITED STATES

■ anthracite

▨ bituminous

🟩 sub-bituminous & lignite

The Possibilities of the Ontario Market.

With a wealth of natural resources with her boundaries Ontario is unfortunate in not possessing coal as one of these. Being the greatest manufacturing province in the Dominion, Ontario has a large number of industries that require power. Of late the Ontario hydro project has replaced coal to some extent but millions of tons of coal are consumed annually.

Ontario imports about 18 million tons of coal each year, 5 million tons of anthracite and 13 million tons of bituminous coal, most of which comes from the United States. That Ontario imports the majority of the coal imported is seen from Figure 4 which gives the total coal imports into Canada. Unfortunately, Nova Scotia coal competes with American coal no farther west than Montreal. The United States Bit. operator enjoys a low cost of production averaging about $2.00 per ton at the pit mouth as compared with a cost of $4.00 a ton in Nova Scotia. This is due to the American coal lying in nearly flat seams more easily accessible than in Nova Scotia where many of the mines work under the ocean floor.

Tha approximate cost of laying down a ton of American bituminous coal in Ontario may be divided as follows: (from what field?

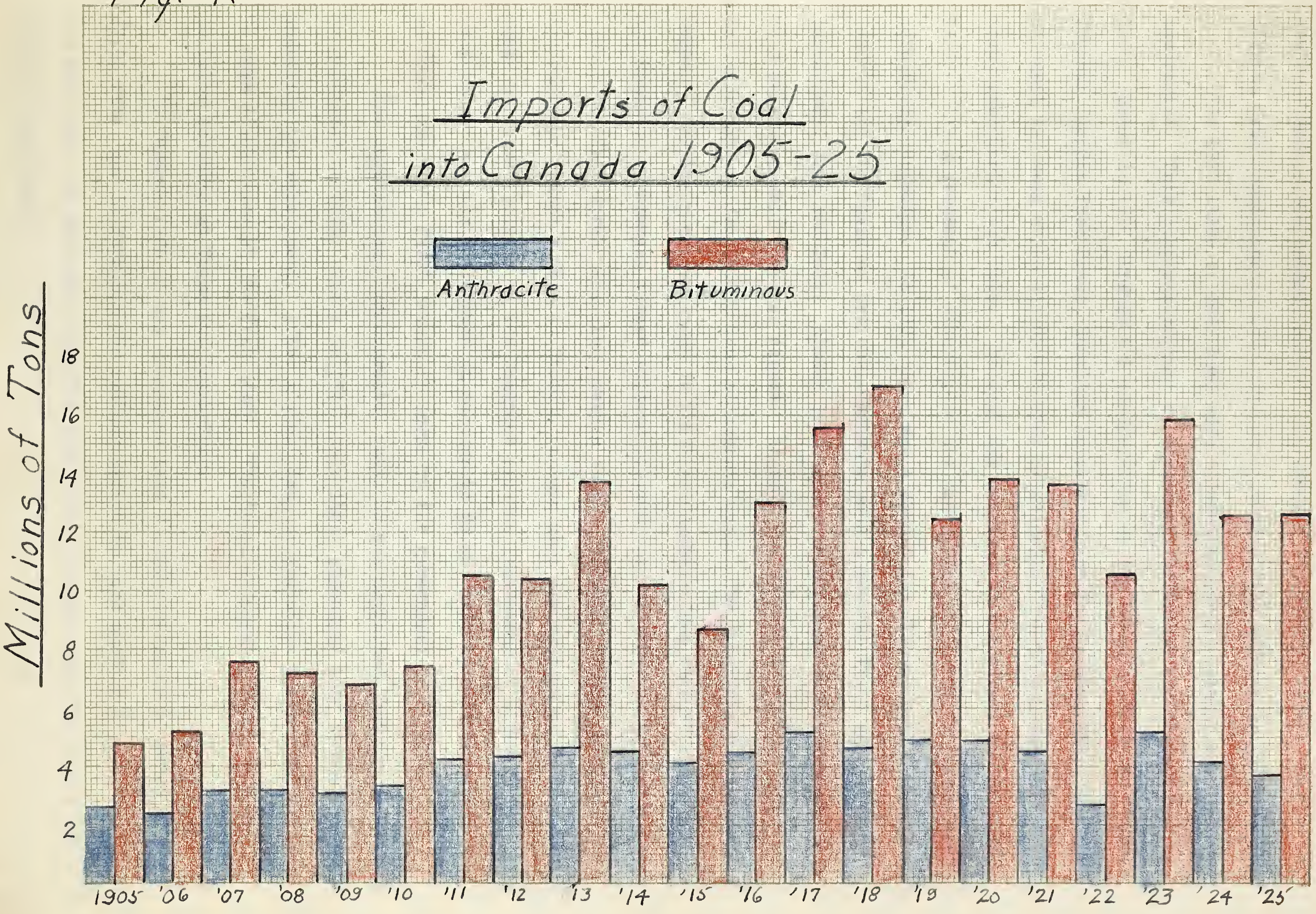
Cost at mine	$2.00
Freight to lake ports	2.06
Lake freight	.50
Duty	.50
Unloading	1.00
Total	$6.06

authority for these figures

As the problem we are interested in primarily is the possibility of marketing Alberta coal in Ontario we must compare the above prices with the cost of Alberta coal laid down in Ontario. In 1922 when Ontario was in acute need of fuel the Canadian government authorized a rate of $7.00 per ton on a trial shipment of 100,000 tons of Alberta coal.

It was in the same year, 1922, that Alberta first began in earnest to

Fig. 4.



Imports of Coal into Canada 1905-25

capture some of the Ontario market. Mr. Howard Stutchbury, before the Alberta Coal Commission in 1925 gave an account of the efforts as follows:

"In 1922 three or four cars were shipped to see if Ontario people were interested. This coal was shipped to government officials and distributed by them. Later in 1922 through the co-operation of the Edmonton Journal, Ottawa Journal, London Free Press, Hamilton Spectator, and the Toronto Star, another shipment was made which was distributed practically free to consumers in about one-quarter ton lots. The coal was supplied by the mines, the freight paid by the government of Alberta, and the newspapers conducted an energetic advertising campaign. In 1923 there was a demand for Alberta coal from all over Ontario and the Canadian National Railways made a special $9.00 rate good during May, June and July. Almost immediately 20,000 tons were shipped and this created a still greater demand. In 1924 the Fuel Controller of Ontario had applications for 90,000 tons of Alberta coal. The opportunity was lost, however, for the year was spent in fruitless negotiations with the railways. The Dominion government wished to send 100,000 tons in order to determine the cost of haulage during the slack season on the railway. It was proposed that the railroad charge a rate of $7.00 a ton and that any cost up to $9.00 a ton would be shared jointly by the Dominion and the government of Alberta, the Dominion to pay the difference in cost up to $8.00, and the cost in excess of $8.00 and up to $9.00 should be borne by the government of Alberta.

The negotiations were conducted until it was suggested that the experiment be conducted in 1925. Early in 1925 the railway announced that it would not undertake the experiment. After a great deal of agitation the railway agreed to move 25,000 tons at the $7.00 rate. The total shipment was not made due to labor troubles at Wayne and Drumheller.

In January 1926 it was announced that 25,000 tons would be moved at the $7.00 rate, and in February the railway agreed to move another 25,000 tons at the same rate but this was to be the last until the rates hearing before the Railway Commission.

Table III will show what progress has been made in supplying Ontario to date.

Table III[5]

Alberta Coal Marketed in Ontario.

Year	Bituminous	Sub-bituminous	Lignite	Total
1918	185	- - -	410	595
1919	60	- - -	248	308
1920	630	- - -	13,281	13,911
1921	3070	- - -	6,828	9,898
1922	126	798	20,649	21,573
1923	- -	1,559	50,775	52,334
1924	10	558	15,957	16,525
1925	- -	2,868	25,963	28,831

For purposes of comparison we must recognize the $9.00 rate which the railroad fixed, and the cost of Alberta Domestic coal delivered in Ontario is made up as follows:

Cost at Mine	$3.50 - $5.00
Freight	9.00
Cost of handling & delivering	2.00
Total Cost	$14.50 - $16.00

With American Anth coal selling at about $15.00 per ton we see the difficulty of Alberta competing with the American operator. There are other factors, too, which prejudice the sale of Alberta coal; because of its high moisture content its calorific value is about 8,000 - 10,000 B. T. U. as compared with the 13,000 - 14,000 B. T. U. per pound of the American Anthr coal. True, Alberta coal slacks considerably, but opponents of market in Ontario lay too much stress on this fact. It will be necessary for the Ontario consumer to purchase his coal during the spring and summer when we are able to supply it. Consequently he will indeed be interested in its storage qualities.

The Industrial Research Council has been carrying on a series of tests

to determine the storage qualities of the various grades of coal. The results show that bituminous coals store very well, sub-bituminous quite well, as do some of the better grades of lignite. Some of the poor grade lignites store badly, but if we intend to build up and retain a market in Ontario we must send only the better grades of lignite [illegible] so we need not concern ourselves with the poorer grades. The Fourth Report of the Research Council gives the following data on storage of coals:

Table IV.

Comparative disintegration loss on Storage of Domestic Coals.

Normal moisture content in coal as mined.	Comparative disintegration loss, one year's open storage
5% to 10%	1% to 5%
10% to 20%	5% to 15%
20% to 30%	15% to 30%

Disintegration loss does not mean a very large loss in heating value but produces more fine coal, which is undesirable. These tests are on a small scale and with the coal exposed to the weather, so undoubtedly on larger masses less surface would be exposed and less disintegration would take place. If the coal were stored placed in the consumers basement it would store quite well for a season.

The poorer storage qualities of Alberta coal give the Americans another advantage, for the American coal sold in Ontario can be stored almost indefinitely without material change in physical properties.

If Alberta wishes to capture the Ontario market she must not only have lower freight rates but must carry on an extensive educational program. The Ontario consumer is prejudiced in favor of anthracite which he is accustomed to, and he dislikes using a fuel which he does not know how to handle and which would necessitate further cost, as his furnace would have to be changed to burn Alberta coal. The trial shipments have already

gone a long way towards breaking down old prejudices, but it will be necessary to continue teaching Ontario consumers how to burn our coal most satisfactorily and efficiently, until we have captured most of the present anthracite market.

Why do we wish to replace anthracite as a domestic fuel, is a question that might well be asked. With American coal enjoying low production costs and low freight rates it is able to compete readily with Alberta coal as far west as Winnipeg. It is on the freight rates that the Americans enjoy the greatest advantage, for on the lakes the boats are used chiefly for transportation of iron ore from Duluth, and for grain from Fort William and Port Arthur. Thus any cargo ~~that~~ they can carry on the return trip is just that much extra profit, and consequently extremely low rates are set to encourage the traffic. That this is detrimental to the Canadian operator is only too evident; if Alberta sends coal to Ontario there is such a small volume of commodities carried west that the coal must bear the cost of the transportation east and of the movement of the cars west again.

Since bituminous coal can be laid down in Ontario for from $6.00 to $7.00 a ton there is no use trying to capture that market from the United States for some time to come. American steam coal is sold at from $8.00 - $8.50 on the Winnipeg market, whereas the freight rate alone from the Crowsnest Pass to Winnipeg is $5.20, so to compete the Alberta operator must be content to sell his coal at $2.80 to $3.30 a ton at the mine, which is less than cost.

It is only the highest quality of steam coal that the United States exports, and as many of their operators are able to sell the coal on the basis of payment when the dealer disposes of it, we see only added hardship to the Albertan who so often requires payment as soon as the coal is shipped.

With the possibility of capturing the bituminous market in Ontario disposed of, let us examine the anthracite market. It is here that Alberta's greatest hope of establishing herself in the Ontario Market exists. On the average Ontario imports annually about 5,000,000 tons of anthracite, although

figures for 1924 show an importation of only 4,183,594 tons, which were divided as follows:

From Great Britain	275,277 tons
From United States	3,908,317 tons

The anthracite obtained from Great Britain was largely from Wales.

Even allowing for British anthracite there is still a possible demand of 4½ million tons to be satisfied. How this can be done under present conditions is a problem that has puzzled those promoting the sale of Alberta coal in Ontario and as yet no satisfactory solution is in sight. One thing that is certain is that a $7.00 freight rate is essential. The past five years has been a period of experimentation, of opportunities wasted by prolonged negotiations with the railways and by labor troubles in Alberta.

The experiments have been satisfactory and it is now time for concerted action by those interested to formulate a policy which will enable Alberta domestic coal to replace anthracite.

It is to be hoped that the Railway Commission sets a rate which is no higher than $7.00. If it does, Alberta operators must assume the burden of supplying the coal at a price which can compete in Ontario. Nearly all of the "domestic" mines of the province are idle for the greater part of the summer so it would be a distinct advantage for the operators to set a special summer price and continue operation which will allow them a moderate profit rather than close the mines temporarily and suffer a loss. This special price might could be established by negotiating with the miners for a lower wage rate for the period, say May 1 to September 1. The miners should be quick to grasp the advantage of four months of work at lower rates rather than four months of enforced idleness.

The Manitoba Market

At the present time Alberta coal supplies the railways from Kamloops in British Columbia to Winnipeg in the east. Coal at the Winnipeg terminal supplies engines going to the east, thus the coal is used to a distance about half way between Winnipeg and the next coal supplying station. Beyond this point the railways [illegible] find it much cheaper to use the American coal. This indicates that the entire steam coal market of Manitoba should be supplied by Alberta instead of by the United States. Most of the American coal comes into Manitoba by way of the lakes, and as statistics do not discriminate between the coal consumed in Ontario and that sent to Manitoba it is impossible to ascertain just what part of the market the Americans control.

It is estimated that Manitoba's consumption of steam coal is between 300,000 and 500,000 tons annually. All of the bituminous coal and some of the small sizes of the sub-bituminous and lignite coals supply the steam market. In evidence before the Alberta Coal Commission in 1925 one witness estimated that at the peak (1920) Alberta supplied 50% of this market, and another said 40%. In comparison with these figures, in 1925 Alberta only supplied about 10% of the market.

Table V.6

Shipments From Alberta to Manitoba.*

Year	Bituminous	Sub-bituminous	Lignite	Total
1917	99,039	------	150,510	249,549
1918	120,132	- - -	387,728	507,860
1919	41,647	- - -	270,437	312,084
1920	143,202	- - -	456,404	599,606
1921	86,548	- - -	408,456	495,004
1922	21,053	62,982	436,473	520,508
1923	10,025	60,431	483,183	553,639
1924	5,453	61,805	443,149	510,407
1925	18,226	83,835	407,594	509,655

* Previous to 1922 bituminous and sub-bituminous were listed together.

At the present time American operators are using Manitoba as an outlet for surplus coal which and it is often sold below cost. This practice of dumping should be curbed by the Dominion government passing an effective anti-dumping law, and also by forcing the American operator to make a true statement of value instead of allowing the coal to be invoiced so low that the duty paid is much less than it should be. [illegible] As soon as dumping was eliminated Alberta could easily capture the Manitoba steam market, or at least supply her annually with about 100,000 tons more than she now does.

In 1923-24 Alberta and Saskatchewan imported from the United States 6,268 tons of bituminous coal and in the same years Alberta, Saskatchewan and Manitoba received a total of 113,140 tons from British Columbia mines. True, these amounts are not large but they should have all been filled by Alberta coal.

The domestic market of Manitoba is supplied largely by the "domestic" coals from Alberta and by the lignites from the Souris district, although some anthracite and bituminous coals and coke from the United States are used. At present Alberta controls about as much as she can of the very competitive domestic market and we need not expect much expansion in that direction.

Does not touch coke problem

The Market in Saskatchewan

The province of Saskatchewan is Alberta's best customer, as over 1,000,000 tons annually are sent from Alberta for consumption in Saskatchewan. Table VI shows the sales of Alberta coal for the years 1917 - 1925.

Table VI.7

Shipments of Alberta Coals for Consumption in Saskatchewan.

Year	Bituminous	Sub-bituminous	Lignite	Total
1917	174,687	- - -	959,450	1,134,137
1918	273,195	- - -	1,091,544	1,364,739
1919	245,714	- - -	865,698	1,111,412
1920	171,209	- - -	1,134,416	1,305,625
1921	284,015	- - -	1,007,188	1,291,203
1922	214,269	51,338	1,104,846	1,370,453
1923	69,965	28,541	1,124,948	1,223,454
1924	50,749	54,639	1,084,400	1,189,788
1925	55,600	63,159	1,178,894	1,297,653

The above figures show that Alberta supplies Saskatchewan with a large percentage of her steam and domestic coals. Coals from the Souris district although of poorer quality have a decided advantage over Alberta coal in price, and in the area near these lignite mines the coal is used for both steam and domestic purposes. It is estimated that only about 10% of Saskatchewan's domestic market is supplied by Souris coal.

There is no hope of Alberta displacing Souris coal in the Southern portion of Saskatchewan so Alberta's only hope of increasing her market in Saskatchewan lies in increased population. (a great opportunity for some young student of the U. of A.)

Market In British Columbia

In the markets of British Columbia Alberta must be prepared to meet the competition of coals from Vancouver Island, and from Washington. Alberta lignites and sub-bituminous coals are more desirable for domestic use than the bituminous Island coals. Alberta now sells some domestic coal in Vancouver and means must be sought to increase this market. The great difficulty in establishing a price that would compete is the freight rate from Alberta

compared with the freight rate from Vancouver Island. The freight rate from the Alberta Coal Branch to Vancouver is \$3.20 a ton + .20¢ a ton switching charges, and from the Crowsnest mines to Vancouver \$4.40 a ton. Coal from many British Columbia mines can be landed in Vancouver for less than \$1.00 a ton freight, so although Alberta mining costs are less, the freight rate causes an almost insurmountable barrier to Alberta establishing herself, especially in the steam market in Vancouver. If Vancouver wishes to become the world port that she aspires to be, adequate bunkering facilities must be provided and this will open a market for Alberta steam coals. An increasing amount of Alberta grain is being shipped to Vancouver each year and this should be encouraged as the grain carrying ships require bunker coal and Alberta coal would supply some of the bunker market.

Although it is apparent that at present Alberta's disposal of steam coal in British Columbia is not great the following figures will show that the sale of lignite coal is steadily increasing.

Table VII.[8]

Consumption of Alberta Coal in British Columbia

Year	Bituminous	Sub-bituminous	Lignite	Total
1917	54,035	- - -	18,798	72,833
1918	69,163	- - -	26,849	96,012
1919	57,267	- - -	33,111	90,378
1920	69,675	- - -	54,116	123,791
1921	61,710	- - -	51,904	113,614
1922	22,427	14,564	69,701	106,692
1923	23,344	14,351	70,631	108,326
1924	26,292	11,599	76,295	114,186
1925	33,509	13,326	68,202	115,037

That Alberta can continue to increase her sale of domestic coal, there is no doubt, but an aggressive educational campaign must be launched in British Columbia as in Ontario, to overcome the prejudice in favor of Island coal. Once that is broken, the market should readily increase, and as business develops it can be expected that the railways will grant freight rate concessions and this in turn will tend to a further volume of business as prices can be established that will compete with British Columbia coal.

British Columbia sends a few thousand tons annually into Alberta but there is no justification for this, the orders would readily go to Alberta mines if efforts were made to get them.

The United States Market.

Previous to 1924 Alberta supplied a greater market in the United States than she does at present, as she lost markets during the strike and has not been able to regain them since. The lignite coals of Montana offer too much competition to expect much expansion of the Alberta market in the northwestern part of the United States. Some bituminous coal is sold to American railways and some in Spokane and Seattle. With the erection of several coal cleaning plants in the Crowsnest Pass, capable of producing at least six sizes of coal from the very finest, to lump coal, the sales of Alberta coal in the steam markets of the United States should increase. It is unfortunate for the market that Fernie coals enjoy the advantage of location and can be sold in the United States at about .80¢ a ton less than Alberta coal.

Some domestic coal is sold in North Dakota, but the smaller sizes are in demand and more would be absorbed if they were available.

The coal fields of the United States can compete too readily with Alberta coal and Alberta operators should not anticipate any great market in the United States, although the present market can be increased somewhat.

No through - freight rate

Alberta's Home Market

Alberta's annual production, including all grades of coal, is about 6,000,000 tons, although it is estimated that she is capable of producing twice that much with present plant force, and development. Of the total production, only about one quarter is consumed within Alberta, so we see how dependent Alberta operators are on the markets outside of the province. The following figures from Coal Statistics for 1925 give the destination of Alberta coal for the years 1924 and 1925.

Table VIII.[9]

Shipments of Coal from Alberta Mines by Grade and Destination.

1924

Destination	Run of Mine	Lump	Nut and other grades	Slack	Total
Alberta	239,495	564,167	290,253	276,448	1,370,363
Saskatchewan	112,069	800,618	186,769	90,341	1,189,797
British Columbia	30,711	53,460	25,477	1,274	110,922
Manitoba	20,179	384,086	86,742	20,365	511,642
Ontario	1,485	9,821	4,958	141	16,405
United States	3,064	4,868	19,430	17,316	44,678
Railroads	1,577,312	162	24,008	5,984	1,607,466
Total	1,984,315	1,817,182	637,637	412,139	4,851,273

1925

Destination	Run of Mine	Lump	Nut and other grades	Slack	Total
Alberta	239,025	578,672	294,002	297,067	1,408,766
Saskatchewan	100,255	902,224	208,122	88,195	1,298,796
British Columbia	18,907	56,782	26,629	15,579	117,897
Manitoba	23,202	374,341	89,338	24,707	511,588
Ontario	522	20,785	7,151	- - -	28,458
United States	12,051	7,346	11,283	19,077	49,757
Railroads	1,957,557	596	136,064	9,255	2,103,472
Total	2,351,519	1,940,746	772,589	453,880	5,518,734

The above survey shows the railways to be by far the largest consumers and it also shows what I mentioned previously, that Alberta's greatest market in the United States is in the smaller sizes. The sale of coal in Alberta and Saskatchewan and to the railways is fairly constant, so the task that confronts the operator is to develop markets in the other Canadian provinces and in the United States.

Competition

Previously in this essay I have stated the advantages enjoyed by United States coal and Saskatchewan lignite and noted how their presence restricted Alberta's market. British coal is not a large factor, but it supplies about 200,000 tons of anthracite annually to Ontario.

The competition of hydro-electric power is very great. It has been calculated that, for industrial purposes, it would take 27,000,000 tons of coal a year to equal the hydro-electric power now used in Canada. According to a report by the Conservation Commission of Canada, there were, in 1918 in the province of Alberta, 4 hydro-electric plants, with a total capacity of 31,980 horse power, and 42 steam plants, with a total capacity of 51,805 horse power, producing electricity by steam. The development of hydro-projects in Alberta will never be very great as the available water power supply is limited, and with the increasing efficiency of steam turbine practice it is doubtful whether hydro-development will continue to increase as rapidly as previously. That hydro-power will ultimately decrease the consumption of coal cannot be assured, for if the development of water power brings with it increased industrial activity there is every likelihood that the demand for coal will increase. As brought out before the Royal Coal Commission during its investigations in 1925, France now uses three times as much hydro-electricity as before the war, but corresponding industrial development has increased the coal consumption to 6,000,000 tons more annually than during the pre-war period. Scandinavia, too, with an enormous increase in hydro-projects since the war, imported 2,500,000 tons more of coal in 1924, and 1,000,000 tons more in 1925 than she did before

the war.

Except in the southern portion of the province wood will offer effective local competition to coal for many years to come.

With the development of oil fields in Alberta and the production of crude oil another competitor to coal appears on the scene. With the low gasoline content of the oils from the Wainwright field there is every likelihood that it will be sold very cheaply as a fuel oil, thus replacing some of the coal. The high efficiency of Diesel engines is a great inducement towards the use of oil as a fuel. Already the railways are using fuel oil instead of coal in their locomotives in the forest area of British Columbia. Fuel oil, may in a few years become a factor that has to be reckoned with by the Alberta coal operator.

Natural gas, too, has caused a considerable loss of business to the coal mines. The cities of Medicine Hat, Calgary and Edmonton, as well as several small towns in the south, use natural gas for domestic purposes where previously they used coal.. At present natural gas consumption is largely limited to domestic use; industries still relying on coal for their power. As with oil, the field of natural gas may increase, and as more areas are developed it may be used for industrial purposes.

Weaknesses of the Industry: -

The difficulties of the coal industry are of national concern, for, without fuel, railroads could not run, agriculture could not get its products to market, great manufacturing enterprises would not be possible, nor would settlement in a large portion of the prairie provinces be practicable.

Undoubtedly the present coal situation is due in part to inherent weaknesses of the industry itself, and, before a solution to the problem can be suggested, we must carefully examine the industry to determine exactly the nature of the difficulties and how they may best be remedied.

The present high cost of production must be materially reduced before our coals can compete successfully with other coals on the market, and with this in view I will make a survey of the cause of high production costs and how they may be reduced. I will deal with each of the causes in turn as indicated in the following outline:

(1) Overdevelopment
(2) Ease of opening of new mines
(3) Labor troubles
(4) Accidents
(5) Geological difficulties
(6) Need of good engineering practice.

(1) Overdevelopment

In dealing with this aspect of the problem we are dealing with one of the most important factors. During the war period, with high prices prevalent and mines able to dispose of their entire output, little thought was given to the possible outcome of the rapid expansion and every effort was made to develop the mines to the fullest extent. The result was that, when conditions began to return to normal, the operators found themselves with mines capable of an output far exceeding demand, and with high-paid workers unwilling to see a reduction in their wages.

The public itself is partially to blame for the continued overdevelopment, for very few purchase their coal until it is actually required, and then the demand is such that it is necessary for the mines to be capable for a few months of a peak production which is many times the output during slack months. Just what this means to the operator, the miner, and the public very few realize.

Overdevelopment unnecessarily increases the overhead, as it results in irregular operation; just how serious this is can readily be ascertained by a glance at the following tables from the Alberta Coal Commission's 1924 Report. The tables show the average number of days worked by the mines at particular capacities.

Table IX[10]

Days Worked - Bituminous mines, Crowsnest, Canmore, Brazeau, Mountain Park.

Percentages of Full capacity	1921	1922	1923	1924
81% - 100%	83	89	103	56
61% - 80%	66	52	62	24
41% - 61%	59	17	35	9
21% - 40%	16	12	21	9
1% - 20%	9	1	9	1
Mine Idle	72	132	75	204
Possible working days	305	303	305	303

Table X.

Lignite Mines[11]

Percentages of Full capacity	1921		1922		1923		1924	
	Leth.	Drum.	Leth.	Drum.	Leth.	Drum.	Leth.	Drum.
81% - 100%	123	79	92	90	91	70	76	82
61 - 80	17	21	21	24	17	41	24	16
41 - 60	27	12	13	13	22	20	3	6
21 - 40	5	16	17	3	20	11	5	6
1 - 20	12	9	3	7	8	22	1	2
Mine Idle	125	173	163	173	152	144	202	198
Possible working days	309	310	309	310	310	308	311	310

These tables show that the mines operated for only a short period at anything near full capacity, a large portion of the time at partial capacity, and about one quarter of the possible working days they were idle.

This is a deplorable state of affairs when we consider that the estimated capacity of the mines in the province on a basis of 300 days operation per year is as follows:

	Bituminous	Sub-bituminous	Lignite
Estimated capacity	6,366,000	1,200,000	7,190,000
Maximum production to date -	3,241,614	635,073	3,359,434

Idleness of the mines is a serious expense, as overhead charges including taxes, pumping, and ventilation, have to go on regardless of whether the mine is working or not; slacking of the roof and ground movement call for timbering, which is a continuous expense. The cost of all this must be borne by the consumer and results in a high-priced coal.

The above are not the only charges that must be put down against irregularity of operation. The short working year of the miner is bad as is also the uncertainty of work; the miner faces the certainty of enforced idleness and also an uncertainty as to when the idle days will come. Although there is little opportunity in the average mining town for the miner to obtain other

work during the idle days, the very uncertainty as to when the idle days will come makes it impossible for him to do so.

"Irregular operation requires more mines and mine workers, and this involves a sad waste of capital investment and a sadder waste of man power. This excess of capital and labor in the coal industry, employed but not kept busy, must both seek wages for idle time as well as for working time. The high cost of this inflation of mine capacity and of working force is properly charged against what the mines produce, however short the working year, and the coal consumer pays the score."[12]

The consumer could aid in remedying these conditions by offering a more regular demand. He could do this by buying some of his coal during the slack times, and the operator should encourage this market by offering a lower summer price as an inducement. This in turn would necessitate a summer wage to the miner, but surely the miner is sufficiently awake to his interests to accept a lower wage for the summer and have much steadier work, than a few days of work at a higher wage.

The coal mining industry supports in idleness several hundred men, whose average wage would be about $1,000 a year, and this unnecessarily adds to the price of coal. To relieve the coal industry of this burden is difficult, for with the irregularity of work eliminated there will be several hundred men who must be transferred to other occupations. To do this, strenuous objections from the miners themselves must be overcome. Mining is a peculiar occupation; the miner must be on hand to take the work when it offers and it tends to unfit him for other kinds of work. Mining is not as dangerous as is popularly believed, it coming fourth in a list of dangerous occupations. The miner works under conditions that vary little from season to season, and, as he escapes the extreme heat of summer and the severe cold of winter, he is unwilling to leave mining for some other occupation. The principal reason however, that the coal miners refuse to leave the mines and seek other employment when the mines are working only two or three days a week, is

that they earn so much more per day while they do work, than the same class of labor in other occupations. It is estimated that in Alberta under the present scale of wages the miner averages about $8.00 per day.

Irregularity of operation can best be overcome, as I have already suggested, by encouraging the consumer to store coal. This is much more satisfactory than the coal being stored at the mines, or by dealers, as such procedure would necessitate a large outlay of capital in proper shelter for storage purposes and for rehandling of the coal. This could not be done for less than about 25¢ a ton.

The transferring of the miner to other occupations should be dealt with by the provincial government. There is always an appeal for more immigrants, especially farmers and farm laborers. Why not encourage the surplus miners to settle on farms by granting them a loan over a twenty year period - this loan to be available only if they desire to purchase land or obtain a homestead. It might be contended that these men are not fitted for the farms, but they are accustomed to hard labor, and know no less about farming than many of the immigrants who are brought from Europe and settle on farms.

(2) Ease of Opening New Mines

This is one of the fundamental causes of continued overdevelopment in the industry. There are too many mines opened and staffed. None of them can sell coal to their maximum capacity or even to the capacity needful for efficient operation. In many portions of the province the coal is too easily accessible, and when prices rise sufficiently to warrant it, numerous new mines are opened. In general, a greater number of mines does not mean greater competition and lower prices, it merely means that the market is divided between more operators and the increased overhead keeps prices high. Although our coal resources are vast, it must not be overlooked that the effect of overcompetition is the mining of only the best and thickest seams and losing for all time the thinner and impure coals which are surrounded by abandoned workings.

At present the ease with which new mines can be opened in the province involves a large loss of capital; annually about 70 mines are abandoned and about the same number of new mines are opened. Out of the some 300 mines in the province, 40 control 90% of the production, whereas half this number could produce as much annually as they are all doing now. The outstanding example of the operation of too many mines in one area is that of Drumheller where there are about thirty mines.

There are only two effective ways of limiting the increase in the number of mines; government restriction or consolidation. No new leases should be granted on public lands except to an existing company which desires additional land in order to continue operations, or to a new claimant who could prove that public necessity requires the development of the new land.

On account of the number of mines that are abandoned annually, temporary restriction would have the effect of placing the industry under the control of the larger and better equipped mines. Alberta's coal resources are so vast that restriction would have to be continued, otherwise in a short time more mines would be opened and overdevelopment again result.

If opening of new mines was more difficult the larger mines would be encouraged to buy out their weaker competitors, close the mines, and thus by greater production reduce their overhead, with a corresponding reduction in the price of coal. The closing of the smaller mines would dispense with the services of numerous officials whose salaries are now adding to the cost of coal, and large quantities of surplus machinery could be disposed of.

Much may be said in favor of consolidation of mines but it must hot be allowed to develop too far as there is an economic limit to consolidation. Large mines enjoy the economy of large scale production, effect a saving by the purchase of supplies in large quantities, avoid wastage of coal by not leaving barriers between mines as is now done. A large enterprise is better able to offer salaries to obtain the best men, and to establish an efficient sales organization to dispose of the coal.

(3) Labor Troubles

Labor troubles cause an enormous loss to the coal mining industry and the frequency of labor difficulties is distressing. The miner is entitled to a wage which will allow him a decent standard of living, but when the trend of prices is downward the miner should accept a corresponding reduction in his wage. Here, however, lies the difficulty, for as long as strong unions exist, when high rates of wages are prevalent the unions will insist that they be maintained. This was well illstrated by the strike in the bituminous fields in 1924. During the war wages had mounted rapidly but the operator had no difficulty in disposing of his coal at high prices, and wage increases demanded by the miners were granted. A few years after the war the operator saw that if he wished to meet competition his prices must be lowered, and consequently, he could not afford to pay as much for his labor. This caused him to ask the miners to accept a lower wage scale which they refused. At the time, nearly all of the Alberta miners were members of the United Mine Workers and the union was largely responsible for the strike being called. However, during the strike period, Alberta markets were being supplied by American coal and the result was that after several months of hardship the Alberta miners decided to break with U. M. W. and negotiate separately with the operators.

This break with the U. M. W., and the formation of local unions was a good thing for Alberta. Although the smaller unions have little strength as compared with the one union, yet it allows suitable wage scales to be fixed for each particular area. The difficulty with the larger union was that a uniform wage scale was fixed and it was determined by the costs of the most difficult production. This resulted in the consumer paying higher prices for the coal than he should, as conditions vary so from area to area, even from mine to mine, that it is impossible to fix a standard scale that will be just to operator, miner and consumer alike.

I do not wish to detract from unions as I consider them essential, but I do not believe that the Alberta miners should rejoin the U. M. W. The average miner had very little to say as to the terms and conditions of his employment, as to when he would work or when he would strike, or as to the percentage of his earnings the union officials should check off and require the operator to deduct from his earnings. Union fees to the U. M. W. were much higher than those of the local unions and the miner received relatively less of his pay.

If the operator is to be able to regulate prices so as to take advantage of market possibilities as they arise he must have a larger control over union labor, and it will be better for him to negotiate with a local union which understands conditions and will see the advantage or disadvantage of what is offered, than to negotiate with officials thousands of miles distant who, understanding very little of local conditions are fighting blindly for a principle.

Strikes cause a great loss to the miner himself for any loss occasioned the operator must come out of the price of the coal. Thus the miner not only suffers hardship and loss of wages during the strike period but the operator cannot afford to pay him as much, as he must make up for his own loss. Miner and operator alike suffer loss from the disruption caused by strikes and the loss of markets. Alberta coal fields are still struggling to recover markets lost during the strike of 1924. During that year there were eight strikes in the west, involving 8,523 men who lost 1,236,112 working days.

Some means must be taken to eliminate strikes, or at least reduce their number to a minimum. Just what we must take into consideration in so doing is perhaps best summed up in the following words of the late President Harding in his address to the United States Congress in 1922:

"The right of labor to organize is just as fundamental and necessary as is the right of capital to organize. The right of labor to negotiate, to deal with and solve its own particular problems in an organized way, through its

chosen agents, is just as essential as is the right of capital to organize.

Just as it is not desirable that a corporation shall be allowed to impose undue exactions upon the public, so it is not desirable that a labor organization shall be permitted to exact unfair terms of employment, or subject the public to actual distresses in order to enforce its terms. Just as we are earnestly seeking for procedures whereby to adjust and settle political differences between nations without resort to war, so we may look about for means to settle the differences of organized capital and organized labor without resort to those forms of warfare which we recognize under the names of strikes, lockouts, boycotts, etc."

These principles are fundamental and should be seriously considered with a view to obtaining legislation on them. The coal mining industry is of just as much national importance as the railways, so why should the public suffer great inconvenience while miner and operator attempt to adjust differences. The Railway Commission after thorough investigation sets as justly as possible, rates by which the public and the railways abide. A Canadian Coal Commission should be appointed by the Dominion government and, as agreements are nearing termination the operator and the miners should present their cases before the Commission which would draw up a scale of wages suitable for each area, and it should be made compulsory for both operator and miner to abide by rulings of the Coal Commission.

It might be difficult at first to get the industry to see that this was in its own interests, but after a few years without strikes both operator and miner would agree that it was the best plan.

(4) Accidents

A great deal of time is lost yearly by accidents. With the elimination of the small mines accidents can be reduced, as the larger operator can take measures to avert them. Idleness caused by accidents is so costly to the large operator that it is in his interests to spend money in making the mines

as safe as possible. That there is need of greater precautions is evidenced by the explosions at Bellevue and McGillivray Creek mines during the past year with a death toll of twelve. In addition to this there are the deaths caused in mines by falls of rock, haulage accidents, etc. Accidents cause loss in pay to a man, due to loss of work during the already too short a mining season.

Accidents, as well as absenteeism, necessitate the "spare link" system at mines, and this causes loss of time breaking a spare man into another man's job. Suppose there were an accident on the haulage, the spare link system will very likely cause a disruption of the haulage, because it is being handled by a green man; shortage of cars and dissatisfaction among the miners results. Also there is greater danger of accident at the time.

The mining laws in Alberta regarding safety measures in the mines are good but they might be made stricter and there would possibly be less accidents.

There are mines in the bituminous fields of the United States which are divided into zones, and at the end of a stated period the men in the section of the mine which has had the least accidents are rewarded. This has led to competition and the men take pride in avoiding accidents, with the result that the mines in which the plan has been used have found their accidents considerably reduced.

In all of the mines in the province only the experienced miners should be given the dangerous places and accidents will thereby be reduced.

(5) Geological Difficulties

The Cretaceous coals, to which the coals of Alberta belong, lack uniformity, sometimes the coals are quite dirty and the seams are often badly faulted. Most of the lignite coals lie in flat seams but the bituminous coals in the Mountains are all pitching. It is this variation in Alberta coal that makes it more costly to mine than the Carboniferous coals of the United States, which are nearly all flat-lying. The dirtiness of the coal in some mines has necessitated the abandonment of the mines, as at Lille in the Crowsnest Pass.

At several other mines in the Crowsnest it has been found necessary to erect cleaning plants which cost over a quarter million dollars each. This expenditure increases the cost of the coal.

Little can be done as regards geological difficulties except studying carefully the nature of the geological conditions in each area with a view to dealing with the geological problems that arise, in the quickest and most efficient manner.

(6) Need of Good Engineering Practice

The following quotation from an article by George Otis Smith is just as applicable to the coal industry of Alberta as to that of the United States. "The matter with the nation's coal bill is that it includes too much unemployment and too little productive work, too low earnings, a shameful waste of energy instead of a worthy exhibition of thrift in the industry, widespread discontent with an uncertain job rather than the wholesome satisfaction a good workman takes in steady and productive employment. The social failure of the coal industry can be traced to economic defects and the cure for these is engineering.

What engineering can do for the industry is already well known, for we today have large coal mines well laid out and equipped with modern machinery which show in actual practice how we can better the business of coal mining. Cheaper coal and larger earnings are two ideals which can be attained by engineering after bargaining has utterly failed."[13]

Much can be done to reduce production costs of coal by establishing good engineering practice underground. Too little attention has been paid to this very important side of the industry in Alberta. Labor constitutes about 75% of the production costs of coal and any improvement in method by the installation of machinery to reduce hand labor, or any reduction in the time required for each particular operation will materially reduce the cost of coal. Mines should be laid out so that the coal can be transported as cheaply as possible; there should be efficient distribution of cars so no time is lost waiting for cars. Mechanical appliances should be used whenever it is seen that by so doing costs

will be reduced and efficiency increased. The way to increase the output of the miner is to organize properly the work of the industry and of the individual mine, to give the miner a chance to work continuously throughout the day and thus earn more, by larger earnings and not by a higher wage rate.

All metal mines are staffed with technically trained men and their success is well known. The coal mines of Alberta have not enough technical men and the present conditions will continue as long as the examinations set for mine officials are such that non-technical men can qualify for the positions. It might be contended that it is obviously unfair to prevent the advancement of non-technically trained men, but it is for the betterment of the industry, and colleges are turning out sufficient trained men who should readily be given the preference. Better that a few suffer through lack of advancement, than that the public as a whole should continue to suffer through unwarrantedly high coal prices.

What I have said is substantiated by the following quotation from the U. S. Coal Commission's Report: 10

"What engineers can do for the industry is shown in the larger and newer mines, which are well laid out and equipped with modern machinery. Good engineering, which includes the wise management of men, as well as the efficient handling of material, can work out reforms underground far more important than is apparent at the surface. To these tasks the industry should invite the best technically trained men and thus raise the status of the operating side of coal mining."

Extension of Markets.

The reduction of mining costs is an absolute necessity before any satisfactory solution of the coal problem can be attained, and it is absurd to advocate a solution that does not have as its primary aim low cost of coal at the pit mouth. There is no one happy factor that will afford a solution, but only by a judicious combination of all the important factors can a really satisfactory solution be evolved. With this in view, ways and means of extending the markets for Alberta coal will be discussed.

This phase of the problem will be dealt with as follows:

(1) Immigration
(2) Subsidies
(3) Coking and briquetting
(4) Co-operative Marketing
(5) Statistics as an aid to the Industry
(6) Nationalization of Mines
(7) The Bergius Process

Immigration:-

Undoubtedly immigration is the ideal method of obtaining markets for Alberta coal. The natural increase in population, which is estimated to be about 2% or 3%, is not populating Canada quickly enough, and the Provincial and Dominion governments should combine in formulating an aggressive immigration scheme which would readily encourage suitable types of settlers from Europe to come to Canada. Just what this means to the coal industry is readily seen by the fact that Canada's per capita coal consumption averages about 3.5 tons per annum. There are such vast areas in the prairie provinces suitable for agriculture and only awaiting settlers, that the Dominion and Provincial governments should make every effort to populate these areas. As a whole, the immigrants bring money with them and this increases Canada's wealth. Increasing the nation's population is to ease the burden of debt, for although a greater population would increase the cost of administration slightly, yet it would not

be in proportion to the increase in population, and we would thus have more people to pay the taxes. Increased population is just as essential to the prosperity of the railways as to the prosperity of the coal mines. With more settlers there is more passenger and freight traffic, and the railways, realizing this, have for a number of years sent representatives to Europe from time to time to bring settlers to Canada, and they have had considerable success. The railways do not merely encourage settlers to come, and then leave them stranded, but consider it their duty to these new Canadians to definitely locate them. The Canadian Pacific Railway Company offers the immigrants land, giving them twenty years to pay, and charging interest at the rate of only 6%.

Since the pre-war period immigration to Canada has been deplorably small and the rate of increase in Canada's population has been disappointing.

What is needed is an immigration policy that will readily encourage settlers to come, and which will concern itself with their welfare for a few years after their arrival. At present, prospective settlers are offered a very cheap transportation rate, but added to this the government should, after having consulted the wishes of the immigrant, settle him in a definite locality and give him a chance to make a success by offering him assistance in the form of loans. Financial assistance should be granted by the government, as it is a well known fact that many of the immigrants are not of the wealthy class, and if the immigrant fails because he could not get the assistance he needed at the start, the glowing pictures painted by the successful immigrants on visits to their home-land will be somewhat discredited by the tale of woe and misery told by a disillusioned settler, who rightly has a grievance against the Canadian government which persuaded him to come and then neglected him.

The British Empire Settlement scheme has met with very little success and few have availed themselves of its opportunities. This is not due to any inherent weakness in the scheme, but Canada has not had any well-defined

immigration policy, and little effort has been made to encourage Europeans to come. The thousands who are waiting each year to get into the United States before their quota is filled, and the thousands who are annually disappointed in their attempts to enter, proves there is no dearth of prospective settlers, and the proper encouragement on our part would bring many of them to Canada.

A step in the right direction was made when the government of Alberta appointed the Honorable Herbert Greenfield as its representative in London to conduct a campaign encouraging settlers to go to Canada. Later he may go on to the Scandinavian countries with the same purpose in view.

The welfare of the coal industry requires that the Dominion government throw itself whole-heartedly into an attempt to settle the large vacant areas of the west, and as the coal industry of Alberta controls nearly the whole of the market of Alberta, Saskatchewan, and Manitoba, a great deal more coal could be disposed of; and this would tend to lower production costs, this to extend the distance which it could economically compete, thus further increasing the market.

(2) Subsidies:

There has been an immense amount of discussion on the subject of subsidies to coal enterprises. It is a recognized economic principle in many countries, that a "baby" industry should be given governmental assistance to aid it for a few years until it is sufficiently well established to compete with foreign industries. Often politics has been allowed to enter into the question and subsidies and ptotective duties have been maintained long after they should have been reduced or abolished.

Anthracite and lignite coal are allowed to enter Canada duty free, but the duty on all bituminous coal is 50¢ a ton. Should this duty be raised to allow more Alberta coal to enter the Manitoba and Ontario markets? Many maintain it should, as a great portion of the $90,000,000 now annually spent in the United States purchasing coal would be retained in Canada, and this would be reflected in added prosperity in Canada as a whole. We must consider,

however, that an increased duty would cause an increase in the price of coal, and as so much of it is used in the industries, this in turn would cause an increase in the price of products produced by the industries. Moreover, Ontario, which is primarily concerned, is a great factor in the political life of the country, and brave indeed would be the government that would endanger its political existance by raising the duty on coal. Whether raising the duty is economically sound or not, there is no hope of relief to be expected in this direction.

The "baby indstry" argument is hardly applicable to the Alberta coal industry and the payment of subsidies would find few adherents. Government assistance can be provided however in the form of reduced freight rates to enable Alberta coal to enter Ontario on a competitive basis. If the Railway Commission does not set a $7.00 freight rate, the governments of Alberta, Ontario, and of the Dominion should divide equally the difference between the $7.00 rate and that set. It should be specified that this assistance could be only obtainable during the summer months as it is then that slack times prevail at the lignite mines.

Arguments will be put forth that the whole of the Dominion should not have to pay to aid Alberta and Ontario, but as Nova Scotia is at present receiving from the Dominion government a subvention of 1/8¢ per ton per mile on coal from Montreal to points in Ontario Alberta has every right to demand aid.

In order that Alberta may capture all of the Manitoba coal market from the United States the Dominion House should be prevailed upon to pass an anti-dumping law to prevent unfair competition, and then if still necessary, Alberta should for two or three years until Alberta coal was definitely established in the Manitoba market, aid by assuming a share of the freight rate. If, however, the Alberta operator reduces production costs, as he can, there should be no need for aid beyond passing of the anti-dumping law.

(3) Coking and Briquetting.

The use of coke as a domestic fuel in Canada is increasing, in 1926 300,000 tons were used. Coke is being produced in by-product-ovens in a number of the larger cities in Ontario and Quebec. Being located in large commercial centres the gas produced is sold to domestic and industrial consumers, the coking enterprise thus being made quite profitable.

Coke is an excellent domestic fuel, as the volatile matter, which is the smoke producing constituent of bituminous coal from which coke is made, has been almost entirely removed. In addition, the heating value of coke is high although its ash content too is higher. The following analysis taken from the Canadian Fuel Board's report on "Coke as A Household Fuel in Canada" shows this.

Table XI.

	Coal as Charged %	Commercial Coke %
Water	2.0	3.00
Volatile Matter	30.0	0.75
Fixed Carbon	58.2	83.60
Ash	8.0	11.40
Sulphur	1.8	1.25
	100.0	100.0

In developing a market for coke the sizing of the coke is of primary importance. Quality, too, is important, but coke cannot be burned successfully unless properly sized for the equipment in which it is to be used.

With a view to encouraging the use and manufacture of coke in Canada the Dominion government placed a drawback of 99% on bituminous coal imported for coking purposes. This was an injustice to the bituminous and sub-bituminous operators of Alberta. Some of the large by-product plants in Ontario were originally designed to use blends of Alberta coals, which had been found

to be very successful, but as soon as the drawback was made effective on bituminous coals for coking purposes these plants immediately purchased their coal in the United States. This drawback should be removed and the duty on American bituminous coal be made uniform regardless of the use for which the coal is intended, thus giving the Alberta bituminous fields a chance to satisfy this market, whichis now about [illegible]0,000 tons annually.

Coke has been produced in beehive ovens in Alberta as there is no market for by-products in the province. For a number of years a considerable quantity of coke was produced in the Crowsnest Pass, the coke being a metallurgical product and being disposed of to industrial plants in the United States. These markets were lost, however, and little attempt has been made to recover them, although it would undoubtedly offer an outlet for a portionof the output of the mines. In the fall of 1926 a small amount of domestic coke was produced with a view to developing a market in Calgary. This would merely displace other Alberta coals, resulting in no gain to the industry as a whole.

Alberta's only hope of disposal of any considerable quantity of coal for coking purposes is to recover some of the old metallurgical markets, and the establishment of by-product plants in Winnipeg and the cities of Ontario.

The Industrial Research Council of Alberta has conducted extensive tests on the suitability of Alberta coals for briquetting and the results have been very satisfactory. As briquettes and bituminous coal supply the same market, briquetting offers no great hope of extended markets.

(4) Co-operative Marketing:

Much has been said in regard to the high marketing costs of coal, and these will continue as long as there are so many mines in the province that make no effort at co-operation. There are too many retailers, and often both wholesaler's and retailer's profits must be added to the selling price of coal. Little effort has been made by the mines to organize a selling system, some dispose of their coal to one or several sellers while others sell their own product. Many dealers handle coal from different mines, and even from different

areas, but this is sometimes of value as they are able to satisfy the consumer's preferences. Often consumers desire a special size of coal or coal from a particular mine.

The Alberta Coal Commission of 1925 states that the average retailer's spread is about $2.50 a ton, which is almost equal to the cost of production. Some effort must be made to reduce the marketing cost.and co-operative marketing has been suggested as a remedy.

On September 1, 1925, the lignite operators of southern Saskatchewan formed the Souris pool, of which nearly all the large mines are members. All available business is divided among the mines in proportion to their respective outputs for the previous year. To avoid a difficulty presented by some of the mines having contracts with particular distributors, these distributors were persuaded to form a single company, the Souris Coal Distributors, which handle the entire output of the pooled mines. The distributing company gets a commission of a certain number of cents a ton on the coal handled.

The pool maintains a central office in charge of a man known as the distributor. He receives all orders from the sales company and distributes them to the different mines in proportion to their share.

The members of the pool are pleased with the results obtained to date, and they think that they avoid over-lapping of salesmen, and that one strong central selling organization is better able to make a more effective canvass of the available market.

Establishment of co-operative marketing in Alberta is no simple matter, as there are so many mines and so many areas, producing different qualities of coal. The larger the number of members in a pool the greater the difficulty of success, as human nature cannot readily be changed, and each mine will be jealous of its own success. Co-operative marketing would necessitate at least six pools if success were to be attained, and perhaps even more would be necessar In the lignite fields there should be a pool which would include Lethbridge and district, another pool in the Drumheller area, and a third composed of the

mines of Edmonton and the Edmonton district. The sub-bituminous mines of the Coal Branch would necessitate another pool. In the bituminous fields there should be a pool comprising the Crowsnest area, another comprising the bituminous mines west of Edmonton, while a seventh pool would perhaps be necessary for the Nordegg area.

In the Drumheller area co-operative marketing has been suggested for years, and it would perhaps be in this area that the greatest amount of success could be attained by co-operative marketing, as the mining is largely localized and the product of the different mines fairly uniform. Not all of the operators are in favor however, although as witnesses before the Alberta Coal Commission brought out, a saving of .15¢ to .25¢ a ton could be effected on distribution.

The success of co-operative marketing depends to a large measure on the attitude of the individual members. Ambitious operators, anxious to avail themselves of an opportunity to rapidly increase their markets would soon find the restrictions of the pool irksome. The entire possible output of each mine cannot be marketed and operators are apt to consider their allotment unfair. Unless co-operative marketing can give the operator assurance of being able to secure a higher price or of maintaining a fixed price there is little inducement to join.

After investigating the possibilities of co-operative marketing the Alberta Coal Commission says, "The Commission considers that co-operative marketing, while very desirable in itself, is by no means a remedy for all of the evils of the coal industry of Alberta. Indeed, if it could be established universally it would tend to perpetuate present conditions of overdevelopment. The Commission also considers that it will be difficult to have an ideal pool until something is done to prevent the opening of more mines until they are needed.

A solution will be found in a more complete merging of the mining interests."

(5) Statistics as an Aid to the Industry

The coal mining industry of Alberta is in need of more complete and more readily available statistics. Statistics should be compiled from week to week, and sent out to the operators whose information made them possible. These statistics could be compiled by the Provincial Mines Branch and need not be for general publication.

In many industries economy has been effected by a system of comparative cost reports, detailing the costs of each step in the production. This information is sent to a central agency which compiles the average cost of each step, and the information is sent to those helping to supply it.

Such reports in the coal mining industry would enable the operator to detect when his costs are above the average, and should be an incentive to him to enquire into the reason for the higher cost, and to attempt to overcome it if possible.

The coal mining industry is a very competitive one, and if the operator were informed about the prices obtained by others in a market, he would be in a better position to bargain with buyers. Such statistics, showing week by week, the volume of coal moving from several fields into different consuming areas would ward off the possibility of distress coal which sometimes results, as on the Winnipeg market, from operators anxiously attempting to find a market for their coal. It takes such a small surplus of coal to glut the market that if the operator knew the amount available in that market the demoralizing effect which distress coal has on current market prices would be obviated.

(6) Nationalization of Mines

Nationalization of mines has been often suggested in Europe and in the United States. State controlled enterprises have found little favor in America, as nationalization tends to curb the ambition and initiative which makes private enterprise a success. Control of the mines by the government would involve a huge capital outlay and the purchase of many unprofitable mines.

It can be argued that state control would result in a uniform price

of product, and of uniform wages to the miner; that it would result in a greater stability in the industry, but what assurance is there that the government would be more successful in negotiating with labor than would private enterprise.

Nationalization of the mines should not be looked to as a solution, as private enterprise should be encouraged.

(7) The Bergius Process:

Coal contains a great deal of volatile matter, and with the great demand for fuel oil an immense amount of interest has been taken in coal as a possible source of oil. A great deal of research has been conducted and much information obtained, but as yet no commercial process to displace natural fuel oil has been perfected.

The light oils from the distillation of coal in the high-temperature coking and gas making processes consist almost entirely of aromatic compounds. The light oils from low temperature distillation of coal are rich in oils which have excellent anti-knock properties, and with high compression in general use, the demand for anti-knock constituents for blending with motor fuels will be increased and will result in a slightly higher demand for coal, as it will be more profitable to extract the benzol from the gas than to sell it in vapor form as part of the gas.

Low temperature carbonization provides a smokeless domestic fuel and from 20 - 30 gallons of tar oil per ton. At present tar oil is worth 4¢ to 5¢ a gallon so no great development need be expected.

Recently in Germany, Bergius perfected a process whereby oils from coal are converted into motor fuels. By the Bergius process, one ton of crude oil in obtained from 2 - 3 tons of coal. The pulverized coal, or tar, forming a thick paste, is heated at 400 to 500°C in an atmosphere of hydrogen under a pressure of 150 to 200 atmospheres. The crude oils on distillation yield about 40 gallons motor oil, 50 gallons Diesel engine oil, 35 gallons fuel oil, a pitch residue, and 10,000 to 12,000 cubic feet of high B. T. U. gas per ton of coal. A typical analysis using bituminous coal lists the

the products as follows:

Motor oil	15%
Diesel and Creosote oil	15%
Fuel oil, lubricating oil and pitch	20%
Ammonia	0.5%
Moisture	8%
Gas	20%
Solid organic material	11.5%
Ash	10%

Either bituminous or lignite coal may be used. Two plants are now being erected in Germany to distill oil by the Bergius process, one in the bituminous fields and one in the lignite fields.

In regard to the Bergius process, A. C. Fieldner, Chief Chemist of U. S. Bureau of Mines, says, " A number of practical difficulties have to be solved before the Bergius process can be applied commercially, and it is questionable whether it or the distillation of the richer oil shales will prove more economical during the early stages of the period of diminution of the petroleum supply."

Undoubtedly, the production of oil from coal will cause an increased consumption of coal as the world's oil supplies become more and more depleted, but as offering any immediate solution of our coal problem we may discount the distillation of oil from coal.

Conclusion

Effort has been made throughout this essay to consider the present conditions of the coal industry in Alberta, their cause, effect, and remedy. The conclusion has been reached that no immediate solution is available and that betterment of conditions must be gradual, for conditions are such that an immediate remedy would be nothing short of a miracle. Greater population is the only true and lasting solution, but as it will be a long time until the west is densely populated we must turn to those remedies which can and should be applied now. These may be briefly summed up as follows:

(1) The application and continuation of restrictions on the opening of new mines.

(2) The investigation of the inherent weaknesses of the mines, and their correction - this resulting in lower production costs.

(3) Reducing strikes to a minimum by the establishment of a Canadian Coal Commission.

(4) An aggressive immigration policy.

Bibliography -

(1) E. Umfreville - "Present State of Hudson Bay Company"

(2) Coal Statistics for Canada (1925) p. 71.

(3) Coal Statistics for Canada (1925) p.72.

(4) Report on Smoky River Coal Field

(5) Report of Alberta Coal Commission (1925) page 149

(6) " " " " " " " 140

(7) " " " " " " " 132

(8) " " " " " " " 134

(9) Coal Statistics for Canada (1925) page 81

(10) Report of Alberta Coal Commission (1925) pages 77,78.

(11) " " " " " (1925) " 78,79.

(12) George Otis Smith - Mining & Metallurgy - May, 1922 - page 4

(13) " " " " & " - May, 1922 - pages 4, 5.